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MINISTER SURVEYS GAS INDUSTRY

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 1, Jan 83 pp 2-6

[Article by V. A. Dinkov, minister, USSR Gas Industry: "Strengthen the Fuel and Energy Base of the National Economy"]

[Excerpts] Putting into life the historic decisions of the CPSU 26th Congress, the Soviet people, under the leadership of the Communist Party and its Leninist Central Committee successfully brought 1982 to an end. In the years of the five-year plan which have elapsed great successes have been attained in implementing the party's long term socio-economic policy directed towards a general improvement in working people's living standards on the basis of growth in public production and its increased efficiency.

As a result of the widespread application of progressive equipment and processes, the USSR Unified Gas Supply System, the world's largest, has been created. It includes 260 gas and petroleum deposits, dozens of gas storage facilities, and a total of 143,000 kilometers of main gas pipelines. Gas now accounts for 27 percent of the nation's fuel balance, and by 1985 this will grow to 33 percent.

The gas industry has been transformed into one of the key sectors in the fuel and energy complex, having a significant influence upon the productivity growth of social labor and the acceleration of technical progress throughout the entire socialist economy.

The CPSU 26th Congress presented the gas industry new problems which are even greater and more critical. They are clearly defined in the "Basic Directions for the Economic and Social Development of the USSR during 1981-1985 and for the Period up to 1990."

The current five-year plan calls for the accelerated increase in gas production, bringing it up to 630 billion cubic meters by 1985, and for increases in petroleum and condensate production.

It will be necessary to solve a number of large problems in geological exploration work, drill through more than 10 million meters of rock, and complete about 4,000 oil and gas wells.

About 65 new deposits will be put into industrial exploitation, including the Sovetabadskoye in Turkmenistan and the Karachaganakskoye in Kazakhstan. A gas

and chemical complex based on the Astrakhan deposit must be built within a shortened time frame. The capacity of the Mubarek gas complex will double, and sulfur, helium and ethane production will grow. During a five year period industrial output volume will increase 40 percent, and labor productivity will grow 26 percent.

During the 11th Five-Year Plan it is intended to begin developing oil and gas deposits on Black and Caspian Sea shelves and on the island of Sakhalin.

Over a five year period there are provisions to lay about 44,000 kilometers of main and distribution gas pipelines with 334 compressor stations. These pipelines include 5 Urengoy - Center lines and the Urengoy-Uzhgorod line with a diameter of 1,420 millimeters.

The central problems in the successful realization of the five-year plan for the development of the gas industry are those of ensuring the accelerated and comprehensive opening of deposits in northern Tyuman Oblast and the implementation of an extensive program of gas pipeline construction to deliver Siberian gas to the nation's central and western regions.

Practically the entire growth in gas production during the current five-year plan will take place through the development of West Siberian deposits. Production at the Tyumengazprom Association should grow 2.3 fold.

The state plan for the economic and social development of the gas industry during 1981 and 1982 was completed in full accordance with the strategy worked out by the 26th Party Congress. In 2 years the national economy was delivered 15 billion cubic meters of gas above the plan. The growth in industrial output was 112.4 percent, while the plan figure was 111 percent, for labor productivity the respective figures were 109 and 108.2 percent. There were savings in production outlays and above plan profits exceed 200 million rubles.

Thus, in evaluating work results for the sector as a whole, one could say that good results have been attained over a two year period. However, our indicators could have been significantly greater if it had not been for the effect of a number of factors seriously complicating the sector's development.

In recent years there have been changes in the geographic distribution of reserves of gas and its useful components. While in 1975 the Ukraine, the northern Caucasus, and the Komi ASSR accounted for about 40 percent of total national gas extraction, in 1980 this had declined to 19 percent, and by 1985 it will drop to 10 percent. Nevertheless, capacity is being developed here, cadre personnel trained, and well planned housing settlements built.

In practically all regions there is a steady growth in the share of new capacity, compensating for deposits which are declining due to the depletion of reserves.

The shift in the center of gas extraction to West Siberia, accompanied by the continuation of increases in consumption in the nation's European section makes it necessary to lay very long main pipelines in extreme natural and climatic conditions and leads to increased capital investments in gas transportation.

There is a sharp increase in the labor and capital intensity of drilling operations due to the development of deep sulfur and condensate bearing reserves in the Volga area, Central Asia, the sea shelves and gas condensate deposits in complex geological conditions in the permafrost of West Siberia. The cost of 1 meter of exploratory and production drilling increased 45 percent during the 10th Five-Year Plan. Capital investments in the growth of new capacity increased from 13.4 to 16 rubles per 1,000 cubic meters of gas.

As a result of these objective factors' influence the growth rates of capital investment and fixed capital outstripped production growth rates.

Gas transportation in main pipelines requires serious work in the improvement of the methodology for determining the optimal variant for loading individual lines and branches in the Unified System, and raising the hydraulic efficiency of gas lines. It is also essential to carry out additional work to improve gas cleaning at fields, and to remove liquids from gas pipelines, especially ones newly put into operation.

Compressor units consume large amounts of gas, oil, and electrical energy. The capacity of main pipelines depends upon their operational stability. One of the indicators of operations is running time between breakdowns. However, in many associations this indicator is considerably below the sector average.

The ministry is giving constant attention to the conservation of materials, fuel and energy resources and raw materials. Association collectives have developed and are implementing specific measures. There have been All Union reviews of the efficiency of material and fuel-energy resource utilization. In addition to definite successes, we also have many shortcomings and unutilized possibilities.

A number of associations and enterprises, such as Kaspmashzavody, the Votkinskiy, Baku, and Kokand gas equipment plants and others are not meeting plan norms for the consumption of fuel and materials.

The cases of excessive gas consumption indicate that the managers of main administrations, associations, and scientific organizations are only very slowly reorganizing their work in accordance with the fuel and energy resource conservation measures which have been posed. Some enterprises have not created an atmosphere of impatience towards cases of unproductive consumption of gas. There is weak control over technical conditions and repair and preventive maintenance on lines, gas pumping equipment, and metering instruments.

Additional measures should be taken to bring order to the study and development of progressive norms ensuring the conservation of fuel and energy resources, and to see that these norms are applied to all parties involved in decision making. We should have effective methodologies for stimulating the conservation of material resources.

Enterprises have considerable reserves for using gas condensate resources.

Contemporary requirements are not met by the level of scientific research and development in the creation of more efficient processes for increasing the degree of gas condensate removal and the coefficient of condensate extraction. Insufficient attention is being given to the introduction of progressive systems for the collection and transportation of condensate.

The ministry has examined this problem and issued a special order which provides for the construction and operational introduction during 1982-1985 of the capacity necessary for increasing condensate extraction; the improvement of technological conditions of well operation; and the development and introduction of progressive technical solutions and the comprehensive automation of condensate recovery.

An equally important problem involves increasing operating capacity and improving its technical-economic indicators through reconstruction and technical modernization. At present the relative share of reconstruction and technical modernization does not exceed 1-1.4 percent of the funds being used. Capital repair resources are used for projects such as the modernization and replacement of obsolete and physically worn out gas pumping equipment, dust collectors, air coolers for oil, water, and gas at compressor stations, energy using equipment and machinery; for the construction and reequipment of starting units and piston intakes, the replacement of cranes on the line, and other items. This diverts resources from capital repair and creates major supply difficulties. The CPSU Central Committee and USSR Council of Ministers Decree: "On the Improvement of Planning and the Intensification of the Economic Mechanism's Effect upon Increasing Production Efficiency and Work Quality" opens great possibilities for the creation of suitable conditions for the reconstruction and modernization of existing enterprises. It gives production association managers broad rights in financing and the ratification of design and estimation documentation and in material-technical supply. Together with USSR Gosplan and USSR Gosstroy [State Construction Committee] we have already agreed upon a list of reconstruction and modernization projects. These rights must be fully exercised.

The West Siberian gas industry has a leading role in the nation's fuel and energy complex. By the end of the five-year plan almost 60 percent of the nation's gas will be obtained here and this region will, in essence, determine the entire economy of the gas sector. In order to ensure the planned growth in the extraction of gas and condensate from petroleum at the Tyumengazprom Association, it is necessary to carry out an extensive program of well drilling and completion, the comprehensive outfitting of the Urengoy deposit, and the construction of six large pipelines leading from it.

One should note the unsatisfactory solution to many problems in this region's development, first of all in the construction of industrial infrastructure.

Lagging in the construction of hard surfaced roads, railroads, river moorages and ports, the lack of intrafield and pipeline access roads, and a complex transportation system for delivering materials and equipment, leading to the loss of much valuable freight, all are having a negative influence on the rates and economics of the sector's development. The West Siberian energy base is being created very slowly.

The preparation of wells and capacity for gas extraction at the Urengoy field is lagging sharply. Drilling operations have deteriorated, footage and commercial speed plans are unfulfilled, and there are large amounts of unproductive time.

At the Tyumengazprom Association there are still low levels of economic and organizational work, a neglect of technology, and cases of inefficiency and a careless attitude towards material, labor, and financial resources.

The association persists with serious shortcomings in the use and storage of materials. There is a considerable amount of poorly supplied equipment at construction projects. there is no control over the unloading and loading of equipment and materials, and poor accounting of the receipt and consumption of materials.

The first task of the Tyumen gas workers, and the ministry's central apparatus and entire collective is to raise the efficiency of our work in West Siberia, keeping in mind that in the immediate future Tyumengazprom's economy will decisively determine economic conditions for the entire gas industry.

In recent years we have begun serious work on the continental shelf. Enterprises developing shelf oil and gas resources are conducting extensive work to increase oil and gas extraction from under the sea. Geophysical exploration work volume has increased and its quality improved. A lot of work is being done on the Caspian Sea, where work has begun on development wells drilled from semisubmersible drilling platforms at depths of more than 150 meters. At the field imeni 28 April construction has been completed and drilling operations begun at a stationary platform in 110 meters of water. Other projects are under way. The development of offshore gas resources is a complicated and expensive operation, requiring extensive material and financial resources.

We should promptly build drilling bases to ensure the continuous supply of drilling platforms working at sea, and to completely eliminate their idle time. Without this it is impossible to effectively develop offshore fields.

The acceleration of scientific and technical progress and the widespread introduction of its achievements are decisive directions for improving our sector's work efficiency. The 11th Five-Year Plan makes provisions for radical changes involving the installation of new GPA [Gas Main Units], and wide use will be made of 16 and 25 Mwt and GTK-10 units equipped with full pressure boosters.

In 1983 construction began on gas pipelines at a pressure of 10 MPa. In order to support this construction, pipe production is being organized at the Vyksunskiy metallurgical plant and process equipment production at Minkhimmash [Ministry of Chemical and Petroleum Machine Building]. It is planned to introduce equipment for cooling gas down to ground temperature on gas pipelines passing through regions of unstable permafrost. The field processing of gas, primarily at automated block-module installations for the comprehensive preparation of gas and the stabilization of condensate, with productivities up to 10 million cubic meters daily, is the basis for the transition to the installation of UKPG [Installations for the comprehensive preparation of gas] with a capacity of 20 billion cubic meters annually.

The beginning of gas condensate field development in the Lower Volga, Kazakhstan, and Central Asia where there are high levels of corrosive components makes it necessary to produce gusher reinforcements for underground equipment up to pressures of 70 MPa, block equipped process lines and installations for condensate stabilization with productivity up to 5 million cubic meters daily and which are corrosion resistant.

In order to increase condensate extraction from reservoirs it is intended to widely introduce secondary recovery methods using high pressure compressors.

Extensive work has been done to technically reequip the sector. Concurrently, however, there are delays in meeting targets. Construction is lagging at an experimental-production facility at Tolyatti for testing experimental models of dust collectors, filter-separators, and air coolers. Documentation has not been worked out for the production of joints with anticorrosion coating.

There is also serious lagging in the solution of a number of very important problems in the construction of 10 MPa main gas pipelines. Construction is still not completed on an experimental section of a pipeline made from multilayer and spiral seam pipe two layer pipe over a 4.5 kilometer stretch at the Novokazymskaya compressor station. There have been intolerable delays in the construction of an experimental-commercial compressor station with GTN-25 units at Gryazovets, and a facility in Novgorod for testing GTN-25 at 10 MPa.

The Ministry of the Gas Industry is conducting a sizable amount of work in the comprehensive automation and tele-automation of facilities, and in the introduction of ASU [Automated management systems] and computer technology.

During the 11th Five-Year Plan provisions were made for the development and introduction of 25 new and the expansion of 7 existing ASU for technological processes at the most important facilities for gas extraction, transportation, and processing. In particular, by 1985 the following should be put into operation: ASUs for the Urengoygazdobych [Urengoy Gas Extraction] Association (including automated systems for working fields, control of operations, installations for the comprehensive processing of gas, for essential compressor stations, and for processing condensate); and for the Tyumentransgaz [Tyumen Gas Transportation] Association.

ASUs and computer technology have become effective tools for improving the efficiency of work at units of the central apparatus and associations. However, there are a number of shortcomings in this important area, subtantially reducing the efficiency of ASU in the sector. Not all association managers are giving the required attention to the introduction and use of ASU and computer technology. There are delays in creating specialized units and in supplying facilities with hardware systems.

The Soyuzgazavtomatika VNPO [All Union Scientific Production Association for Gas Automation] is not fully performing its functions of designer supervision over the operation of ASU. Some association ASU often develop algorithms and programs for management tasks without coordinating them with Soyuzgazavtomatika VNPO, or change and remove tasks approved by departmental commissions, leading to unjustified difficulties in design and introduction.

The sector ASU lacks a unified data base and interconnections between subsystems. Standardized design solutions have been introduced at practically no gas extraction associations.

In the immediate future Soyuzgazavtomatika VNPO must make a careful analysis of the development state of ASU and compile, for all Mingazprom organizations, a unified plan of work for optimization problems and program packages for ASU for the period up to 1985; it must activate the operations of main and regional computer centers and jointly with association managers take effective measures to put all operating ASUs up to planned performance, ensure their effective utilization and the economic return called for by design indicators.

11,574
CSO: 1822/182

MAIN WAYS OF IMPROVING INVESTMENT EFFICIENCY OUTLINED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian 1 Jan 83 pp 10-12

[Article by A. N. Kolotilin, deputy minister, USSR Gas Industry: "Sectoral Reserves for Improving the Efficiency of Capital Investments"]

[Excerpts] The main feature of the 11th Five-Year Plan program for capital construction is that it envisages a sizable increase in the operational introduction of fixed capital in face of a reduced growth in capital investment.

This places special importance upon ensuring the maximum concentration of labor, materials, and finance upon priority projects in order to rapidly put them into operation.

The huge scales of construction and the sector's high capital intensity require the effective utilization of allocated resources, and a radical improvement in capital construction.

In 1981-1982 Mingazprom [Ministry of the Gas Industry] and Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] took a number of measures directed toward the accelerated construction of gas industry projects. Schedules were promptly worked out for the construction of facilities on the Urengoy - Petrovsk and Urengoy - Novopskov gas pipelines, and measures approved for the construction of compressor stations on the Urengoy - Petrovsk pipeline.

Thanks to these measures, last March a 2,730 km section of the Urengoy - Petrovsk pipeline was completed and put into operation, and the Novokazymskaya, Ivdel'skaya, Sergiyevskaya, and Sharanskaya compressor stations were put into operation within reduced time frames.

Putting the line part of the Urengoy - Petrovsk pipeline into operation ahead of time frees labor and material-engineering resources for use on the construction of the Urengoy - Uzhgorod line.

Ministry planning institutes and associations have completed work on planning and estimation documentation, the allotment of land, and the issuance of timber felling permits to build the Urengoy - Uzhgorod line. Organizations from related ministeries have begun preparatory work on compressor stations for the line.

The results of capital construction program fulfillment in the sector are evidence of sizable reserves: the plan for the use of capital investments and the introduction of fixed capital was not fulfilled, and there is lagging in the construction of compressor stations, UKPG, and projects for nonproduction needs.

Planning institutes and clients must accelerate the time frames for designing projects, and make provisions for pace setting rates for priority projects. Associations must make a detailed analysis of the composition of uncompleted construction and take measures to complete projects and formalizing their operational introduction.

Balance in plan targets for the operational introduction of capacity and fixed capital with limits on capital investments and construction-installation work supplied with material-technical resources is a decisive factor in the efficient use of resources provided for capital construction.

The 1983 draft plan for the Mingazprom limited capital investments to 14.3. percent over the 1982 level.

In order to reduce the construction time of new projects, the plan provides for the increased concentration of capital investments on the most important projects. Thus, 66 percent of capital investments are concentrated on the construction of the Urengoy - Uzhgorod (Line I), the Urengoy - Petrovsk, the Urengoy - Novopskov, the Urengoy - Center (Line I) and on fitting out the Urengoy field during 1983.

The concentration of capital investments on priority projects has permitted the 1983 draft plan to increase the introduction of fixed capital by 2.9 billion rubles compared to the five-year plan. The volume of uncompleted construction at the end of the current year should not exceed 64 percent of capital investments (the norm is 74 percent).

Substantial reserves for effective capital investments exist in planning and design.

The ministry's planning and scientific research institutes have done much to reduce the time needed for the design and introduction of new technology and progressive technical solutions for projects. These include:

The development and approval of standardized plans for unitized-block compressor stations with various types of large capacity assemblies, permitting about an 8 percent reduction in construction-installation work and a 12-15 percent reduction in labor costs at construction projects, while the coefficient of density for the system was increased to 42-45 percent;

Standardized design solutions for the connections of all types of assemblies, making it possible to centrally manufacture (in plant conditions) assemblies and intermediate units;

Used the advantages of the new GTN-25, GTN-16, GPA-Ts-16, and STD-12500 units, located them at the zero datum, used full pressure two stage boosters, and a high degree of unitization and automation.

The work done on the standardization of compressor station design should ensure a 236 million ruble reduction in construction installation work and a 7 million person day reduction in labor outlays during 1983-1985.

Within compressed time frames institutes successfully handled the planning and design of such unique installations and the Urengoy - Petrovsk, Urengoy - Novopskov, Urengoy - Pomary - Uzhgorod, Urengoy - Center, and other pipelines.

In recent years optimal planning methods bases on computer technology and mathematical economics have been developed at ministry planning and design organizations. The widespread introduction of these methods at all planning institutes considerably improves the efficiency of capital investments in the sector.

The construction of six pipelines in a single corridor is very important in reducing planning time and accelerating construction. This construction method reduces the amount of survey and design work and compressor station cost because of the fewer auxiliary operation facilities and temporary structures.

The results of consultants studies of many projects are evidence that the reserves for reducing estimated construction costs are far from exhausted. Thus, the total estimated cost of projects studied in 1981 by the Consultants Administration was reduced by 11 percent through the use of improved specification of work volumes, the calculation of potential for using capacity, and the search for more efficient solutions.

The transportation system for hauling pipes, equipment, and materials has a substantial influence on estimated construction cost. During the planning process the most rational system for freight transportation should be selected, with consideration given to transportation potentials in the construction region.

In recent years the estimated construction cost of 1 kilometer of main pipeline has risen approximately 20-25 percent and construction installation work has increased by 15-17 percent. This is due to the difficult weather and natural conditions in the regions where the lines are laid, increases in the costs of building infrastructure projects, and additional outlays caused by increased requirements for environmental protection, and for energy supply system construction's share in roads, bridges, etc.

In spite of the tendency for main pipeline construction costs to increase, there are definite reserves which can stabilize this growth, reduce estimated costs, and improve capital investment efficiency.

Among these one could include:

Provide for unified hydraulic conditions in parallel pipelines, reducing looping and permitting the more effective utilization of installed capacity at line compressor stations;

Lay equal passage junctions across water barriers and reduce reserve lines;

A stricter approach to determining pipelines' category of participation in the right of way.

Strengthen compressor station interconnections through the use of full pressure boosters;

Build improved units which are completely finished at the plant;

Organize the centralized repair of compressor station equipment;

Universally introduce standardized designs for block-unitized main pipeline compressor stations, approved by USSR Gostroy;

Establish territorial restrictions on block-boxes and block-unitized installations.

Establish cost limits for infrastructure (relative share) projects in estimated costs for the projects;

Implement measures to limit the cost of installations included in the estimate for industrial construction demanded by other ministries, departments, and local organs;

More extensively involve ministries, departments, and local organs in the shared participation in the construction of projects for external energy supply, communications, transportation, treatment facilities, etc.

The following can also substantially reduce the estimated cost of construction projects: The use of pipe with improved physical-mechanical properties, facilitating the construction of structures from high strength and light concrete and steel with improved strength; the optimal arrangement of general plans for projects with minimal fire control and sanitary distances between buildings and installations, the non-conduit laying of utility lines; the more rational use of resources for temporary buildings and installations, including the widespread introduction of prepackaged buildings for repeated use.

It is also essential to introduce order into the preliminary approval of transportation systems for delivering freight and large objects.

The implementation of these measures for improving the efficiency of capital investments and using existing reserves will reduce estimated costs for projects during the 11th Five-Year Plan by at least 5 percent, reduce unit capital investments for gas extraction and limit their rise for gas transportation.

One of the main directions for improving capital construction efficiency of above ground projects in the gas industry is the use of the unitized block method, the further improvement of parametric series and the standardization of existing blocks and block boxes for main and auxiliary functions. This will sharply reduce labor outlays at project sites, and accelerate the construction and introduction of compressor stations, field and other facilities.

However, there are a number of unsolved problems in the unitized block method reducing its efficiency. In a number of cases above ground facilities built by the unitized block method are more costly than traditionally built ones, and do not adequately meet contemporary requirements for the economic use of metals.

Block boxes for the same purpose often use different process flow systems and different equipment.

The solution of these problems will help improve the economic efficiency of block unitized installations in the construction of compressor stations and field facilities.

The time required for planning and reviewing projects, and for building and putting them into operation can only be reduced if association-clients, planning institutes, and contracting organizations will work in close contact.

The client and builder have a very wide range of functions, covering the development of plans, the timely supply of contracting organizations with high quality technical documentation, equipment and materials. These and other functions performed by the client to a great extent determine the introduction times for gas industry fixed capital.

Association-clients have a huge role in reducing construction estimated costs and improving its efficiency. Prior to the presentation of plans to the ministry for expert review and approval they should give more attention to evaluating technical and economic indicators.

There are also very large reserves for the improvement of the sector's management structure for capital construction.

An Administration for the Construction of Gas Extraction and Transporation Enterprises (Sibtsentr), 29 directorates for gas pipeline construction, and 64 directorate departments have been created and are functioning in the Mingazprom system.

The administration's functions are conducted through a 5 element and 3 element system in Tyumengazprom, a 4 element system in Ukrgazprom, Glavyugtransgaz, Glavtsentrtransgaz, and Glavvostoktransgaz, and a 3 element system in Orenburggazprom, Soyuzuzbekgazprom, Turkmengazprom, and Armentransgaz.

In order to improve the gas industry construction project management system, a Central Directorate has been created at the ministry. It has entrusted with the function of title holder (general client) for the construction of the Urengoy - Pomary - Uzhgorod (I and II) and the Urengoy - Center (I and II) lines.

The creation of a Central Directorate will ensure that very important projects are promptly supplied with planning and estimation documentation, equipment, and materials.

To bring order into relations between organizations participating in gas industry project planning and construction, the ministry has done a great deal to prepare for publication the "Handbook of Statutes and Instructions for Capital Construction in the Sector".

This handbook contains statutes and instructions on the entire complex of problems involved in the planning of capital investments and design work:

The relationship between client and contractor in concluding contracts, supplying projects with equipment, cleaning and testing pipe, accepting completed production capacity and projects by working and state acceptance commissions, etc.

The handbook makes it possible to improve the technical training of workers participating in the construction of gas industry projects, and enhances the responsibility of ministry officials on the site for the prompt operational introduction of capacity and projects, as well as for the more operational solution of all problems arising in construction projects.

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DRILLING OPERATIONS IMPROVEMENTS OUTLINED

Moscow GAZOVAYA PROMYSHLENNOST' in Russian No 1, Jan 83 pp 26-27

[Article by L. P. Chertkov, deputy chief, Gas and Gas Condensate Well Drilling Administration, Mingazprom: "Improve Efficiency in the Construction of Gas and Gas Condensate Wells"]

[Text] The growth in Mingazprom's gas extraction planned for the 11th Five Year Plan can be attained only through a sizable increase in the number of completed wells in the most promising regions. Therefore during 1981-1985 it is planned to accelerate the increase in drilling footage. In Tyumen Oblast the amount of drilling for gas, gas condensate and oil will increase 3.5 fold by 1985 compared to 1981. Producing well footage at the Orenburggazprom VPO will increase 2.6 fold, and at the Turkmengazprom VPO 2.1 fold.

In Tyumen Oblast the Ukaburgaz and Kuban'morneftegaz Associations will use the watch - expedition method to do a sizable amount of drilling in the Valanzhinskiye deposits at well depths of 3,000 meters. The Orenburggazprom VPO plans to increase footage and have deeper wells under more difficult well completion conditions. While prior to 1981 drilling here was primarily at depths less than 1,800 meters, now, even during the current five-year plan a sizable amount of drilling will be at depths down to 4,100 meters at the Karachaganakskoye field and 4,500 meters at the Astrakhan field under conditions of hydrogen sulfide corrosion and in the presence of salts and AVPD [abnormally high formation pressure]. There will be a similar increase in drilling in Turkmenia, with volume increase continuing in conditions of greater depths, and more complex well drilling conditions.

In spite of these difficulties it is planned to increase the volume of producing well drilling in Tyumen Oblast and Turkmenistan and increase commercial speeds. Thus, at the Senomanskiye deposits commercial speeds should increase from 1,650 to 2,000 meters per rig per month, at the Valanzhinskiye deposits from 900 to 1,400, and in Turkmenistan it is planned to increase commercial speeds from 440 to 490 meters per rig per month.

These footages and commercial speeds can be attained only if a sizable amount of work is done to outfit drilling sites in each region. For example, the planned 2.5 fold increase in drilling in Tyumen Oblast requires the construction and introduction of new bases for servicing and new technical facilities.

In order to ensure the effective work of drilling brigades, Mingazprom is taking serious measures to strengthen drilling enterprises in the region. In Tyumen a production association for drilling (PO Tyumenburgaz) has been created. It includes facilities for servicing all drilling enterprises in the region: a central pipe base, a base for the material-technical supply administration, a central base for production services, a base for rig assembly and a plugging and cementing base, a motor vehicle and tractor enterprise base, and others.

Contractor drilling organizations of the Ukrgazprom and Kuban'morneftegazprom Associations are successfully building pioneer bases at the Urengoy field and planning their expansion as their drilling work increases.

In order to discover and study problems complicating well completion in the West Siberian region, Mingazprom has created a special commission which includes the managers of associations and scientific research institutes (NII) organizing drilling work in Tyumen Oblast. It has worked out detailed and specific measures for improving the quality of well completion and operation in permafrost.

Jointly with sector NII, Tyumengazprom drillers have practically solved the problem of filtering drilling muds during work at the Senomanskiye and Valanzhinskiye deposits. Good results have been obtained in cementing the entire casing and ensuring well reliability. Great results are expected from the conversion to well drilling with electric drives. In view of the delays in equipping fields with high voltage transmission lines and step-down substations, during the first stage the Tyumenburgaz PO used PAES-2500 type autonomous electric generators burning natural gas for its drilling needs. This made it possible to drill 37 percent of the footage in 1981 with electric drive rigs. Drilling commercial speed with electric drive is 231 meters per rig per month more than for diesel drive rigs, and the cost per meter was reduced by 14 rubles.

An analysis of organizational and technical conditions of well completion in Tyumen, Turkmenistan, Orenburg, and other regions shows the similarity of problems linked to the necessity of constructing drilling enterprises in new regions, solving problems of material-technical supply, organizational, and technical plans.

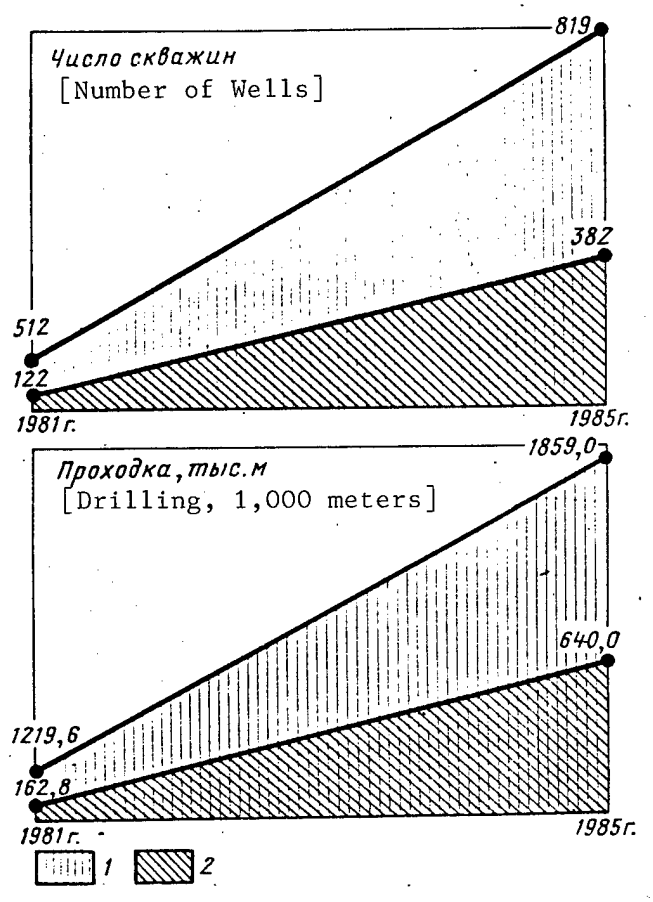
Mingazprom has outlined ways of modernizing and improving work organization in the completion of gas and condensate wells by associations in the sector, and has ratified measures to improve the efficiency of drilling operations and reduce the accident rate. Intersectoral programs have been developed to supplement these sectoral measures. Thus, jointly with Minkhimmash [Ministry of Chemical and Petroleum Machine Building] we have developed a program for the technical improvement of existing equipment and the organization of the production of new types meeting contemporary requirements.

The sector's drilling enterprises are increasing the amount of drilling using new highly efficient types of bits and downhole motors that are produced by the domestic industry, and also licensed bits. It is planned to increase drilling with new types of bits to 704,200 meters. Good results have also been obtained from the use of chemical reagents such as KMTs-700. There are increased

deliveries of tightly sealed and high strength casing pipe, light alloy drilling pipe, high torque spindle turbodrills and other new design drilling engines. There is a considerable increase in the use of flaw detection equipment on drilling tools.

The sector is giving great attention to problems of well testing. Thus, during the five-year plan the use of pipe reservoir testing to determine reservoir parameters in sampling development wells will increase to 335 well operations.

The improvement of drilling mud filtering and the control over the working-off of drill tools has a substantial influence upon reducing the accident rate and improving bit operation indicators. Sector plants have organized the production of a double vibrating screen for filtering drilling muds and of spare parts for drill equipment. Drilling enterprises have increased repairs and inspections of new bits arriving from industry and bits in use.



Growth Dynamics of Producer Well Drilling in the 11th Five-Year Plan (1981 - Actual; 1985 - Planned)

1 - Total for Mingazprom; 2 - Including West Siberia

An analysis shows that the creation of efficient process equipment (bits with a service life of 100 hours and more, drilling rigs with universal installation capabilities, high strength casing and drilling pipe) is planned only for the end of the 11th or in the subsequent five-year plan. Because of this it is necessary to plan the increases in commercial speed using existing equipment standards and levels.

The problems of increasing commercial speed facing Mingazprom can be solved through two independent directions for increasing labor productivity in drilling:

The introduction of new or optimal technical solutions with existing equipment;

Improvements in the organization of labor and production management in well completion.

The improvement of technical-economic indicators of well drilling and completion resulting from the introduction of new or optimal technical solutions is made possible through drilling exploratory-technological (oporno-tekhnologicheskiye) wells and making use of this experience in drilling subsequent wells.

As far as improvements in drilling technology are concerned, a special role should be held by developments directed towards reducing accident rates, i.e. increasing commercial speeds, and consequently towards reducing the costs of drilling operations. Improvements in labor and management organization are another way of increasing commercial speeds.

In recent years SevkavNIIgaz [North Caucasus Scientific Research Institute for Gas] has developed a complex of methodologies and instruction for improving the structure and methods of drilling operation enterprises, improving planning and the organization of control over well completion work at the UBR [Drilling operation administration] level, for a system of material-technical supply, the use of progressive forms of paying labor, and methods for the synchronous organization of work at all structural subdivisions of drilling enterprises.

In order to improve drilling operation efficiency Mingazprom is planning to solve problems of information support for well completion by building, in each region, computer centers equipped with third generation computers.

The analysis of work in the preceding years has revealed and has resulted in the use of reserves. This made it possible to increase the 1981 level of commercial speed for producer well drilling 21.7 percent over the 1980 figure, while development drilling speed increased 19.5 percent.

The results obtained are not limiting figures, and in spite of growing difficulties in well completion can and will be improved.

11,574
CSO: 1822/182

MORE HOUSING NEEDED AT KANSK-ACHINSK COMPLEX

Moscow EKONOMICHESKAYA GAZETA in Russian No 12, Mar 83 p 15

[Article by G. Starovatov, first secretary, Sharypovo Gorkom, CPSU: "Together Under Different Roofs"]

[Text] The young city of Sharypovo has become the staging base for the opening of the unique natural wealth of the Kansk-Achinsk basin. Its inhabitants are building the world's largest open pit mine at Berezovskiy, with an annual capacity of 55 million tons, and the Berezovskaya GRES-1, a 6,400 Megawatt plant.

Stripping work is under way at the Berezovskiy-1 Mine, the first parts of the Berezovskaya GRES-1 are being erected, and the first section of the airport has been put into operation. One after another, the shells of high-rise buildings loom above the city, and new schools, stores, kindergartens and nurseries are coming into use. Last year the collective of the experimental-industrial strip mine dispatched 43 percent more coal than in the year before.

Builders and installation workers have experienced great structural changes. The KATEKenergopromstroy [Kansk Achinsk Fuel and Energy Complex Power Engineering Construction] association has been created and two project trusts have been formed within it: KATEKenergostroy and KATEKgrazhdanstroy [KATEK Civil Engineering Construction]. It is important that the association included a number of construction enterprises located in the city of Nazarovo, as this has markedly increased its production potential.

KATEKstroy, the recently formed construction administration of BratskGESstroy, is gathering strength. It is entrusted with the construction of housing in the city. The Vostokenergomontazh [Eastern Energy Ins_allation] and KrasnoyarskGESstroy Trusts have become administrations. New subdivisions have arisen within the KATEKuglestroy [KATEK Coal Construction] Combine. A production supervision department of Glavkrasnoyarskprommontazh [Main Krasnoyarsk Industrial Installation] has been formed in the settlement of Dubinino.

All this has helped strengthen work collectives and improve the economic and management mechanism.

At the same time, one cannot shut one's eyes in face of serious difficulties, a large number of unsolved and at times very difficult problems of the young city. The main trouble is that there is still not an appropriate base for construction. It is sufficient to note that the daily capacity for the delivery of commercial concrete is only 300 cubic meters at the KATEKenergopromstroy Association, and 100 at KATEKuglestroy. Not a single construction and installation organization has a heated shop; a large part of the equipment is stored and serviced under the open sky. Due to a housing shortage it is impossible to attract and house the essential number of workers. So far only 110,000 square meters of housing have been built, compared to the target of 300,000. The construction of preschool facilities and other service and cultural projects is lagging. The decision to build 150,000 square meters of housing in the city has not been supported by deliveries of prefabricated ferroconcrete structures. The utilities system is not ready for such an amount of housing.

In this regard it would be good to recall that the unconditional fulfillment of the 11th Five-Year Plan target for the construction of housing and cultural-service facilities is a very important task, of great social and political significance in light of the decisions of the 26th CPSU Congress and the November 1982 CPSU Central Committee Plenum. This was especially stressed in the recent CPSU Central Committee Decree: "On Measures for Ensuring the Fulfillment of Plans for the Construction of Housing and Social-Service Projects".

The experience of other large projects in the nation has shown that rapid rates of work at a new site can be ensured only by strong, well developed builders' collectives with a powerful construction industry base. This was the case, for example, when the BratskGESstroy Trust began work at Ust'-Ilimsk and Krasnoyarsk-GESstroy at Sayansk. In our view, the USSR Ministry of Power and Electrification made a serious mistake in entrusting the construction of KATEK facilities to the newly created Glavenergostroy, now the Soyuzenergostroy Association, which did not, and still does not have the necessary construction industry base in Siberia. In addition, having concentrated its main attention upon the construction of the GRES at Ekibastuz, the main administration could not allocate everything necessary to KATEK. The KATEKenergostroy Trust, which was created at a practically bare site in Sharypovo, not receiving the essential support and help from the Central directorate (glavka), was naturally not able to guarantee the given volumes of construction-installation work. What is more, from the very first the trust's management allowed a fragmentation of efforts and resources. The construction of the Sharypovo plant for large panel house building, so essential to the city, was stretched out for more than three years.

BratskGESstroy's appearance (true, after a three year delay) on the Sharypovo site straightened out the situation to a certain degree. In a short time the Bratsk workers introduced more than 30,000 square meters of modern, 9 story housing. However, something strange is happening. KATEKstroy is entrusted with projects in the city and the KATEKgrazhdanstroy of KATEKenergopromstroy has approximately the same tasks. But there is no talk of any kind of cooperation between these organizations being conducted by the managers. They belong to different main administrations.

The first organization receives everything necessary for construction from Bratsk, since it has no base in Sharypovo. The second has a base -- a concrete plant, a construction yard, and shops -- but still depends to a great extent

on the deliveries of prefabricated ferroconcrete which it obtains from Nazarovo in Kemerovo Oblast and from Ekibastuz. Therefore both are engaged in the creation of a production base, but their own, not a common one.

This is clearly unadvisable from an economic and production perspective. It would be good if USSR Minenergo [Ministry of Power and Electrification] would bring the necessary order into this operation and take all measures to sharply increase the rates of residential construction. This would be a guarantee of success in the solution of the main problems.

11,574
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KANSK-ACHINSK PROGRESS SURVEYED

Moscow SEL'SKAYA ZHIZN' in Russian 26 Jan 83 p 1

[Article by P. Zinkeyev, correspondent: "The Mighty Seams of KATEK"]

[Text] The fast company train, with the revealing name of KATEK [Kansk-Achinsk Fuel and Energy Complex], which has only recently started operating on the Krasnoyarsk Railroad, rushed us overnight from the Kray's center on the Yenisey to the Sharypovo Station. Formerly, 2-3 passengers got off here, an unremarkable place, looking like dozens of other backwoods small stations, which had previously been a two minute stop. This time everybody got off, and the small area near the station was immediately filled with the sound of voices in many languages. This is not surprising, for here, at Sharypovo, a mighty project is in full swing and gathering strength.

Here, KATEK extends for almost one hundred kilometers along the Trans-Siberian Main Line. The seams lie close to the surface and will be worked by standard strip-mining methods.

Naturally, only highly productive technology is capable of digging up such a mighty seam. At the miners' disposal are rotary excavators each with a productivity of 5,250 cubic meters of coal per hour, walking, and other excavators. They are now arriving at KATEK from outside the kray. However, near Krasnoyarsk, the gigantic Krastyazhmash [Krasnoyarsk Heavy Machinery] Plant, now under construction and already putting capacity into use, is to supply this type of equipment to KATEK.

However, KATEK isn't just a "chunk of coal" to be extracted, loaded into lines of freight cars and sent to various customers. Coal is KATEK's initial raw material. This appears in the very name itself: fuel and energy complex. There is a very simple, although not completely economical way of converting coal to energy -- burning it in boiler furnaces. KATEK has not rejected this process, but is not using it as its only weapon. Scientists' research has shown, that in addition to its conversion to thermal and electrical energy, it is also advisable to convert KATEK coal to liquid fuel through a catalytic hydrogenation process. It has been established that 5 tons of Kansk-Achinsk brown coal can produce 1 ton of liquid products. According to preliminary studies, by 1990 a ton of liquid fuel from Kansk-Achinsk coal will be 25-30 percent cheaper than fuel refined from petroleum extracted from remote Siberian regions.

Such are KATEK's parameters and essentials. Today it is a huge young project, which began at the old Siberian village of Sharypovo. A little more than a year ago it was transformed into a city. It is being built on an expansive scale, following a general plan, in a comprehensive manner, and meeting contemporary requirements.

KATEK is developing in three main directions: The introduction of coal capacity, the first section of which is the Berezovskiy-1 strip, capable of 55 million tons annually; power production -- the Berezovskaya GRES-1, equal to the Sayano-Shushenskaya GES; and the building of a new city. It is doubtful if any one of them is being given preference.

Perhaps anybody who becomes acquainted with the program for developing the mighty seams at KATEK will ask the natural question: How will the fuel and energy giant's "breathing" affect the surrounding environment? The solution to this vitally important problem lies in the very technology for the extraction, and especially for the processing of the fuel. Scientists at the Siberian Department of the USSR Academy of Sciences made a scientifically based ecological forecast of KATEK and its environmental protective measures. One of the main directions is to not only preserve, but to multiply KATEK's agro-industrial potential. Therefore even now, at the first stages of its construction, top priority is given to the restoration and recultivation of land. The scales are great. Just the first section of the Berezovskiy-1 strip will require the removal of the vegetative and soil cover from 1,250 hectares. In all, this strip mine will occupy 7,100 hectares of agricultural land. After and parallel to this first section, an even larger series of Berezovskiy strip mines and then the Uryupskiye mines will be developed. However, even in the process of coal extraction the land should bloom anew.

It is obviously essential to exert maximum efforts to see that this already established rule be strictly adhered to here, at KATEK, from the first days of its development.

11,574
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CONSTRUCTION AT KANSK-ACHINSK COMPLEX EXAMINED

Moscow STROITEL'NAYA GAZETA in Russian 15 Dec 82 p 2

[Article by N. Kurenkov, instructor, Krasnoyarsk Kraykom, CPSU: "Three Measurements of KATEK"]

[Text] Newspaper readers have become familiar with the abreviation KATEK [Kansk-Achinsk Fuel and Energy Complex]. Its development scales are grandiose. Twenty industrial and cultural-service projects have been built and put into operation. These include the first section of the Itatskaya substation, two schools, a youth center, cafe, an asphalt plant, and other projects. The city of Sharypovo and the settlement of Dubinino are growing. Collectives from about 50 construction installation, transportation and other units of ministries and departments are working on KATEK projects.

However, there is still cause for concern about the introduction of the basic projects at the complex.

The construction of the Berezovskaya GRES-1, the first unit at KATEK, began on an empty field a considerable distance from the Kray's industrial regions. Naturally, the appropriate construction base had not been created here. Railroad, road, and other communications were weakly developed. There was an acute shortage of housing and social, cultural, and service facilities. These three problems were closely linked with one another and it is simply unthinkable to solve them in isolation. A comprehensive approach is needed, with constant interdependence between the development of bases, transportation and social infrastructure. This is what will be discussed.

Housing and social, cultural, and service facilities: Since the beginning of construction only 152,000 square meters of housing have been introduced in Sharypovo and Dubinino, while the plan calls for 280,000. This year things are going even worse. The 10 month program was only half fulfilled. The builders' work is unsatisfactory, above all this is due to the unplanned reorganization of subdivisions carried out this May by Glavenergostroy [Main Administration for Energy Construction]. For example, the Katekenergostroy Trust was broken up, and the newly created Katenergopromstroy Association has still not been formed, although a USSR Minenergo order provides that this be done within a month.

The construction administration of Bratskgesstroy [Bratsk GES Construction] which is involved in this work has not handled the tasks in the introduction of housing. It has not delivered a single meter of the 40,000 square meter annual target.

At the beginning of the year it was decided to send to KATEK 200 finishing workers from Glavenergostroy, Glavtsentrenergostroy and other units of USSR Minenergo. However, this decision has still not been implemented.

There are more than enough examples of irresponsibility, disorganization, and red tape. For three years workers from the Kul'tbytstroy Plant in Krasnoyarsk have been "outfitting" House No 3 in Sharypovo. The ferroconcrete structures plant in Tom'-Usinsk and Glavkrasnoyarskstroy [Main Krasnoyarsk Construction Administration] are violating delivery schedules to this project.

Because of the shortsightedness of workers from Minenergo and Minugleprom [Ministry of the Coal Industry], over the past three years there have been delays in the introduction of more than 120,000 square meters of housing. Where there is no housing there is a shortage of qualified workers.

Transportation: The introduction of housing depends to a great extent upon the capacity of railroads and roads, since all materials must be hauled long distances to the construction site, where there is nothing.

In order to build railroad track and a station, the Krasnoyarsktranstroy Trust created two new units at the Berezovskaya site: SMP-268 and SMP-654, while the Krasnoyarsk administration for road construction and operation created a special DSU [Road construction administration]. Quite a lot of time has passed since the creation of these units, and nothing has been done. At the Berezovskaya site alone more than 100 kilometers of railroad siding must be laid, but so far only 13 kilometers have been completed. Road builders and communications workers are doing no better. Without transportation and communications it will be impossible to complete the jobs at hand. As the work volume increases, the amount of freight transportation constantly grows, and even now it has reached more than 5,000 tons daily. Just one boiler unit at the Berezovskaya GRES-1 requires the transportation of more than 20,000 tons. Daily unloadings should exceed 150 freight cars, of which a good half is homebuilding parts. It is essential to prepare the site for unloading equipment and parts, and to ensure their protection.

A general plan for the development of the complex covered the construction of the projects. It had been planned to build about 50 projects involving railroads, motor vehicle transportation, and communications. In the past three years the general contractors and clients -- USSR Minenergo, USSR Ministry of Communications, USSR Ministry of Transport Construction, and the RSFSR Ministry of Highways -- have mainly been "shaking down" questions of financing, planning, and designing; they have really only begun work on a dozen projects. The repeated requests of party and soviet organs to the appropriate ministries to accelerate utilities installation work rates and volume have not had the desired effect. One cannot say that institutions in the capital have not reacted to our requests, however, no substantial measures are being taken. Every day up to 100 loaded freight cars sit idle in excess of norms due to the undeveloped transport system. In addition, there are gross violations of norms during car unloading.

Construction industry base. As has already been said, KATEK builders do not have the appropriate production base. All materials and equipment are hauled in from other oblasts and republics. Planning organs have allowed obvious mistakes in the creation of a base. Naturally, work here is also very slow.

The introduction of the first section of the large panel home building plant was planned for 1982. However, this deadline turned out to be unrealistic, the construction - installation plan was not being fulfilled.

According to Minenergo's plan, the commercial concrete plant in Sharypovo should have gone into operation back in 1981. The introduction deadline was violated. It would seem that the ministry would take all measures to introduce it at least in the first quarter of 1982, however, such measures were not taken. None of the projects have enough concrete or mortar.

There are also grounds for concern about the installation of enterprises for the production of nonmetallic materials. According to Krasnoyarsk Promstroyniiproyekt [Industrial Construction and Design Scientific Research Institute] 1982 gravel requirements were 880,000 cubic meters. The Nazarovo gravel crushing and sorting plant only produced half of its 700,000 cubic meter planned capacity. It is impossible to haul in gravel from other oblasts. The reason is obvious: low railroad capacity.

In 2-3 years these problems will become even more acute. The construction of KATEK projects requires two million cubic meters of gravel. There is nowhere to get it. In order to introduce additional capacity by the end of the five-year plan it has long been time for Minenergo to begin the reconstruction of the Nazarovo gravel plant, the gravel quarry at the Ozhinskoye deposit and the building stone quarry in Sharypovskiy Rayon. It not yet too late to begin this work if it is undertaken energetically. Gravel production using open air equipment should be organized at the overburden rock dumps of the Kiyashaltyrskiy mine and the Sorskiy molybdenum combine. It is also necessary to set up a sand quarry with a washing facility at the Vladimirovskoye deposit in Nazarovskiy Rayon. All this would eliminate the acute shortage of inert materials.

The lack of a housing construction base has other unfortunate consequences: the first microregion of Sharypovo has housing which is undeveloped from an architectural point of view and is unsatisfactorily planned.

Capacity is growing slowly at the Nazarovo ferroconcrete structure plant, upon which very great hopes have been placed. It was planned to use this expanded capacity to produce parts for houses of new, progressive series. However, Nazarovo and Sharypovo have failed to receive more than 50,000 cubic meters of precast ferroconcrete. Last year capacity for the production of 67,000 cubic meters should have been introduced, but only half was delivered.

At the beginning of June the Sharypovo party gorkom , deputy minister of power and electrification V. Kozhevnikov, and deputy minister of the coal industry V. Belyy discussed the prospects for the KATEK project. The gorkom and gorispolkom reasonably posed the problems of creating a really nice, complete city of power production and coal workers, worthy of becoming the administrative center of the entire complex.

However, the meeting did not find a way of liquidating the lagging which has been allowed in residential construction and the creation of a production base. In fact, the lagging is increasing yearly. The problem, obviously, is that nobody is personnally responsible for violations of plans.

11,574
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KATEK CONSTRUCTION PROGRESS REPORT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 13 Feb 83 p 2

[Article by S. Sadoshenko, special correspondent: "The Coal Bin of the Nation"]

[Text] On a bleak day in September 1947 excavator operators N. Korbatov, I. Kurenkov and S. Pavlov moved the first buckets of ground at the site of the future Borodinskiy coal strip mine in the Siberian village of Borodino. True, they didn't know that they had thus begun coal extraction at one of the planet's richest deposits, the name of which is KATEK [Kansk-Achinsk Fuel and Energy Complex]. This deposit, stretching for 600 kilometers from Kemerovo to Irkutsk Oblast through the center of Krasnoyarskiy Kray, concentrates, at a shallow depth, more than 600 billion tons of brown coal, of which 140 billion tons are accessible by the low cost strip mine method.

The 11th Five-Year Plan is an important step in the development of the complex: preparatory work is being completed and we are beginning to dig out coal from the nation's bin. So far only a little has been done. During this five-year plan the growth in coal extraction capacity at KATEK is only 21 million tons. This is one-third of the sector's growth, but is at the same time quite modest when one considers the basin's total reserves. However, the decisive step has been made, the door to the bin is opening wider and wider.

When I first saw the world's largest walking excavator, the ESh-100/100 (it is simple to decipher: a 100 meter long boom and a 100 cubic meter bucket), it seemed unbelievable, This excavator is now working in KATEK's western section, stripping overburden rock at the Nazarovskiy mine.

It has now reached planned capacity, removing 13 million cubic meters of rock annually. It would seem that KATEK needs just such gigantic equipment. A dozen such excavators and all the coal is ours! However, specialists at the Berezovskiy-1 mine, the capacity of which is 55 million tons annually, have proposed another extraction system -- continuously operating equipment.

For a number of years a rotary excavator system with a productivity of 5,000 cubic meters per hour has been digging coal at the Borodinskiy mine, and a 5,250 cubic meter per hour excavator is being assembled at the Berezovskiy-1. This giant machine, build by the Zhdanovtyazhmash [Zhdanov Heavy Machinery] Association, has the serial number "1".

Delays in overburden stripping operations are the eternal misfortune of coal strip mines. KATEK coal is not deep, but all the same walking excavators will delay the movement of the rotary system. This is why it was decided to also use a rotary excavator for stripping operations with a productivity equal to the one engaged in coal extraction. Components for this machine are arriving at the assembly site of the Berezovskiy-1 mine.

I was able to see how a rotary machine operates. The 13.5 meter diameter rotor crunches through the seam. The operator of the self propelled loading system can direct the stream of coal to freight cars, and in 25-40 seconds a car is loaded. To an outside observer this capacity seems huge, but specialists are not satisfied. The Machine Building Plant imeni Leninist Komsomol of the Ukraine has already built a centrifugal rotor with a speed 3.5 times faster and weighing one-third less than the present gravity rotor. Series production of the innovation is beginning this year. What is more, work is under way on the creation of rotary systems with a productivity of 12,500 cubic meters per hour. These giants will be manufactured at the Krastyazhmash Association, which is beginning to produce the first units -- EKG-12.5 excavators.

Thus, KATEK will produce a lot of coal. The question arises as to how it will be transported. Different variants were examined and designers settled upon a conveyor system. This will include working face, main line, and transfer conveyors, and a 14.5 kilometer long double conveyor to the Berezovskiy-1 GRES No 1.

This would seem to be simple, but our nation has never produced conveyors such as these. The coal is to be carried by 1,600 - 2,000 millimeter wide belts. In order to make them the USSR Minneftkhimprom [Ministry of the Petroleum Refining and Petrochemical Industry] must construct a special plant, and the USSR Minchermet [Ministry of Ferrous Metallurgy] develop the production of a new item -- brass plated cables.

The impression is created that at the Kansk-Achinsk Complex, even the simplest problems, for which specialists have long had answer , must be solved anew, and at a higher level.

The Berezovskaya GRES-1 will introduce the nation's first 2,650 ton per hour steam generator using powdered coal. The boiler is 130 meters high and weighs 20,000 tons. Parts for this boiler unit are arriving at the installation site from the Machine Building Plant imeni Ordzhonikidze in Podol'sk.

"We intend to guarantee the introduction of the first block at the Berezovskaya No 1 in 1984, and in the first four years introduce a block a year, then organize the flow of work to introduce two blocks. By the middle of the 1990's another sequence of work will be organized and then we will annually be able to complete 4 blocks, each with a capacity of 800 Megawatts."

"During the current five-year plan we are building the Itat - Novokuznetsk -- Barnaul 1,150 kv line, and in the beginning of the 12th Five-Year Plan we will build it to Ekibastuz. Thus, the Ekibastuz GRES, KATEK, and the Siberian GES will be connected." This picture was drawn by P. Neporozhniy, minister of power and electrification, at a meeting of the coordinating council at the Krasnoyarsk Kraykom of the CPSU.

Yes, even during this five-year plan, a powerful flow of energy will come from KATEK. However, the Kansk-Achinsk's brown coal will not only produce electrical energy, but also synthetic liquid fuel. Of course, this is the long term, but confident steps are now being made on way way to energy technology enterprises using coal to produce mazut, motor fuel, and plastics. A new sector, coal chemistry, is being created before our eyes.

USSR Minenergo's State Energy Institute has developed a highly intensive method for the thermal breakdown of coal using a combined heat transfer agent and producing semicoke, tar, and combustible gases. This method has been tested in Kalinin and at the Sibelektrostal' Plant in Krasnoyarsk, where more than 80,000 tons of Kansk-Achinsk coal was processed. The main energy technology installation, the ETKh-175, with a productivity of 175 tons of coal per hour, is now being installed at the Kray center. It should be a prototype for future giants.

Refined solid fuel can be obtained from relatively low temperature processing of coal if the method proposed by the collective at USSR Minugleprom's Institute of Fossil Fuels is used. In order to develop this method a 100 ton per hour experimental autoclave is being built at the Borodinskiy mine.

A process is also being worked out to gasify coal in a fluidized bed with high temperature cleaning of the syngas obtained. This can be used to synthesize hydrocarbons, and analogues of some types of motor fuel. An experimental installation for making liquid fuel by the hydrogeneration method is planned for the Berezovskiy-1 mine.

In short,science is attacking the synfuel problem on all fronts. It is already known that 4-5 tons of KATEK coal will produce 1 ton of synfuel. Its industrial production will begin in the 1990's.

Until recently hundreds of scientific collectives were engaged in each of the many problems, and they didn't attempt to examine them comprehensively. Perhaps there was previously no need for this. However, KATEK required the creation of its own scientific center, and last year it was organized. It is called the Scientific Research and Planning-Design Institute for Problems in the Development of the Kansk-Achinsk Coal Basin (KATEKNIIugol') and is part of USSR Minugleprom. The institute is already engaged in the entire complex of regional problems, from the development of the newest technology in strip mining, to the production of synthetic liquid fuel.

Every morning buses full of builders leave from the pioneer microregion, one of the three being built at the KATEK capital. One of them goes to the Berezovskaya GRES-1 construction site. Here the foundations for a 370 meter stack are ready, a reservoir dam and a boiler unit are being built. Another bus route goes to the installation site for the rotary excavator, and a third to the site of the future Berezovskiy-1 mine, where the preparation of strips is under way.

Builders come from the Ukraine, Moldavia, Lithuania, Latvia, Bashkiria, and Dagestan. Five shock detachments are working at KATEK, uncovering the wealth of this gigantic coal bin.

SYNOPSES OF ARTICLES FROM 'COAL OF THE UKRAINE', MARCH 1983

Kiev UGOL' UKRAINY in Russian No 3, Mar 83 pp 47-48

UDC 622.33.013:338.45 (477.61/62)

TECHNICAL AND SOCIAL DEVELOPMENT OF MINES IN THE CENTRAL REGION OF THE DONBASS IN THE ELEVENTH FIVE-YEAR PLAN

/Synopsis of article by G. Ya. Stepanovich and V.F. Larikov, pp 2-4/

/Text/ The status of the technical level of mines in the central region of the Donbass. The primary trends in scientific research, the design features of the new equipment that is being developed. The influence of technology and mechanization upon the technical and social level of development of the enterprises. One table.

UDC 622.61 (474.61/62)

UNDERGROUND TRANSPORT IN MINES OF THE DONBASS

/Synopsis of article by S. Ya. Petrenko and G. Ya. Palant, pp 5-7/

/Text/ The primary trends in the development of technology and equipment for the underground transporting in Donbass mines. The status and level of modern mining and transport equipment. Three illustrations.

UDC 622.673.1.004.74.002.72

REPLACEMENT OF A MINE ELEVATOR

/Synopsis of article by V. S. Chizhikov and N. Ya. Smetana, p 8/

/Text/ The replacement of an outdated elevator in a mine utilizing the new "carry in - carry out" technology. Assembly of the new unit on a special stand and the dismantling of the old vehicle in an assembled form using a gantry. Two illustrations.

UDC 622.28:622.831.24

CONTROLLING THE ROOF DURING ERECTION OF THE RUBBLE STRIPS USING THE BLAST DRILLING METHOD

/Synopsis of article by V.A. Dmitriyev, Yu.F. Savenko and E.O. Cholak, pp 9-10/

/Text/ Experience in switching the foof to a smooth lowering using rubble strips, which are erected by use of the blast drilling method, and a wooden support, which is left in the mined space between the rubble strips in the specific mining and geological conditions of the mine. Two illustrations.

UDC 622.834:622.281

DISPLACEMENT OF ROCKS IN BEDDED PREPARATORY MINING OPERATIONS, WHICH ARE BEING INFLUENCED BY CLEANING WORK

/Synopsis of article by E.K. Frolov and V.M. Andriyenko, p 11/

/Text/ A prognosis of the amounts of displacement of the roof and soil for bedded preparatory mining operations, which are being done ahead of the wall and maintained using the rubble strip - mass method.

UDC 622.831.32a

DEFORMATIONS AND STRESSES IN GAS-SATURATED COALS

/Synopsis of article by A.V. Astakhov, A.A. Galmanov, A.I. Ketslakh, S.A. Yarunin, pp 12-13/

/Text/ A model of coal as a three-component system, consisting of a condensed elastic medium with internal voids, a gas which fills these voids, and a bordering phase, which is formed by gas molecules, which are adsorbed at the edges of the gap between the condensed elastic medium and gas. The deformations and stresses and the connection between them.

UDC 331.024:622.222.6

LABOR PRODUCTIVITY OF WORKERS EMPLOYED IN EXTRACTION IN DEEP MINES

/Synopsis of article K.D. Naumenko and V.A. Gerasimov, pp 13-14/

/Text/ The worsening of the technical-economic work indicators of mines with an increased depth of mining operations. A comparative characteristic of a group of mines of the Pervomayskugol' Association on the level of labor productivity of workers, the extraction of coal and the value of the gap between the depths of the mining operation and the skip shafts. One illustration and three bibliographic entries.

UDC 622.23.05:622.013:658.314.72

STIMULATING THE DESIGN OF COMPLICATED MINING EQUIPMENT

/Synopsis of article by Ye.F. Kolesnikov and V.M. Yakimovich, pp 14-15/

/Text/ Providing stimulation on design work for complex mining equipment. One table.

UDC 622.274.526.48.001.4
(477.61/.62)

RAISING THE WORK EFFICIENCY OF COMPREHENSIVELY MECHANIZED WALLS IN THE CENTRAL REGION OF THE DONBASS

/Synopsis of article by A.A. Segeda and E.I. Barulina, pp 15-17/

/Text/ Results of research on the reasons delaying an improvement in the indicators of comprehensively mechanized walls; recommendations for raising the efficiency of their work.

UDC 622.002.5:62-192:658.387

RELIABILITY OF MAN-MACHINE SYSTEMS

/Synopsis of article by S.Ya. Salyga and Yu.B. Gryadushchiy, pp 17-18/

/Text/ Determining the reliability indicators of man-machine systems in conditions of cleaning faces in mines of the Ukrainian SSR Ministry of the Coal Industry.

UDC 622.233.61-83

AN INSTALLATION FOR DRILLING BLAST HOLES BENEATH THE ANCHOR SUPPORT ON THIN STEEP BEDS DURING SHIELDED COAL EXTRACTION

/Synopsis of article by A.T. Gorgonov, A.N. Gavrish, and L.P. Sammel', pp 18-19/

/Text/ The design and principle of the operation of a drilling unit, which simplifies the drilling of blast holes. The results of mine tests of the units under the shielded assembly and in the installation pocket. One illustration.

UDC 622.516

EXPERIENCE IN OPERATING A HYDRAULIC ELEVATOR UNIT

/Synopsis of article by G.A. Lazarev, Yu.V. Li, N.N. Bezuglov, pp 19-20/

/Text/ Technical indicators of a high-pressure hydraulic elevator unit for cleaning a deep sump (91 meters) and pumping water. The results of its operation in mine conditions at the 50 years of the October Revolution Mine. One illustration.

UDC 621.313.13-213.34.019.3

EVALUATION OF THE RELIABILITY OF SAFE ASYNCHRONOUS ENGINES IN THE FREQUENT FORWARD AND REVERSE GEARS MODE

/Synopsis of article by V.D. Glavnyy, V.G. Orlov, G.Ya. Rodionenko; pp 21-22/

/Text/ Base models of the reliability of engines and a methodology for evaluating their reliability durring operation in a mode of frequent forward and reverse gears.

UDC 622.445:621.635-19.001.8

ANALYSIS OF THE OPERATING RELIABILITY OF THE BLOWERS OF THE MAIN VENTILATION

/Synopsis of article by V.P. Parshintsev, T.I. Velikodchenko and M.M. Kovalevskaya, p 22/

/Text/ The operating reliability of the main ventilation blowers of the VTs-32, VTs-31.5, VTsD-31.5 models. The reasons for the malfunctions of the main assemblies of the blowers.

UDC 622.807.7

PROTECTING THE ENVIRONMENT DURING THE EXTRACTION OF COAL

/Synopsis of article by N.G. Tkachenko, V.P. Vavilin, I.G. Reznikov, Z.P. Perel', V.M. Kirilenko, pp 23-24/

/Text/ Replacing the biologically rigid surfactants such DB, OP-7 and OP-10 wetting agents used in the coal industry with biologically soft and more efficient wetting agents that do not have a negative effect on the environment. One Table.

UDC (556.314+556-114):622.51 (477.61)

INFLUENCE OF THE RELEASE OF MINE WATER FROM THE WESTERN DONBASS UPON THE MINERALIZATION OF THE WATER OF THE SAMARA RIVER

/Synopsis of article by A.M. Antroptsev, T.D. Kudryavets, K.L. Bondarets, pp 24-25/

/Text/ The generalization and analysis of data from many years of observations of the amount of water seeping from mines in the Western Donbass and of the mineralization of the water that they release. The influence of this release upon the mineralization of water of the Samara River - the primary source of water for the region. One table.

UDC 556.3+550.4:622.01
(477.63)

CHANGING THE HYDROCHEMICAL CONDITIONS OF WESTERN DONBASS UNDER THE INFLUENCE OF ECONOMIC DEVELOPMENT

/Synopsis of article by N.T. Grishko, R.I. Razuvayeva and N.F. Podgornova, pp 25-27/

/Text/ The factors which influence the hydrochemical conditions of Western Donbass. A set of measures for protecting the environment. One table.

UDC 622.867.004.6:65.012.2

EVALUATION OF THE EFFICIENCY OF TECHNICAL SOLUTIONS THAT PROVIDE SAFE MINE CONDITIONS

/Synopsis of article by A.Z. Naymanov and L.G. Khukhlovich, pp 27-28/

/Text/ The principles of technical-economic justification for the creation of new safety equipment for mines. The criteria and methods for comparing the variants of technical solutions, connected with protecting the workers from dangerous production factors. Recommendations. Two illustrations.

UDC 622.822.3.012:24:622.413.3:
536.244

INFLUENCE OF HYDRAULIC COAL EXTRACTION TECHNOLOGY ON THE ENDOGENIC FIRE HAZARD

/Synopsis of article by L.P. Belaventsev, V.A. Skritskiy and Yu.I. DONSKOV, pp 28-30/

/Text/ The results of experimental research on the influence of the parameters of the thermal condition of air upon the endogenic fire hazard of existing extraction units at Kuzbass hydraulic mines. One illustration.

UDC (622.02.539.217.5):621.039.85

DETERMINING THE NATURAL GAS PERMEABILITY OF A COAL SEAM DURING THE RADICAL FILTRATION OF GAS INTO A WELL

/Synopsis of article by I.A. Ryzhenko and A.I. Ryzhenko, pp 31-31/

/Text/ A method of determining the natural gas permeability of a seam. The merit of this is the simplicity of performing the mine experiment, which is important in practice. One table. One illustration. Two bibliographic entries.

UDC 622.01:621.39

AN OPTIMAL METHOD FOR ORGANIZING THE UNDERGROUND GEOPHYSICAL COMMUNICATIONS IN MINES

/Synopsis of article by V.I. Yatsyshin, E.N. Tsaturyan and Yu.G. Myasnikov, pp 31-32/

/Text/ A brief review of the present status of prospects for the development of underground geophysical communications (PGS) systems. Experimental data, which provide a description of the real properties of natural communications guide lines through coal seams.

UDC 622.01:550.3:551.252

THE OPERATIONAL CLARIFICATION OF COAL SEAM HYPSOMETRY IN MINE FIELDS

/Synopsis of article by N.D. Sidorenko, V.V. Kaydash and A.M. Dobryanskiy, pp 32-33/

/Text/ Clarification of the geological-mine surveying graphics. A methodology for the operational clarification of mining operations plans. A graphic method for determining the locations of techtonic disruptions.

UDC 622.33:622.366.1

METHODS AND PROBLEMS FOR REDUCING THE SULPHUR CONTENT OF COAL

/Synopsis of article by S.G. Aronov, G.I. Piven' and S.V. Vershinina, pp 34-35/

/Text/ Methods for reducing the sulphur content of coal. The basic fundamentals of future methods for removing the sulphur from coal.

UDC 622.794.1:622.765

INFLUENCE OF PAA [POLYACRYLAMIDE] ON FLOATATION CONDITIONS AT CONCENTRATING MILLS WITH A CLOSED WATER CYCLE

/Synopsis of article by Ye.Ye. Rozhnova and M.A. Vovchuk, pp 35-36/

/Text/ The accumulation of PAA at various points in the layout of concentrating mills having a closed water-slurry cycle. The influence of the remaining PAA concentrates upon the flotation process. One illustration.

UDC 622.7.092:543.822

MONITORING THE QUALITY OF FUEL WASTES DURING ITS USE

/Synopsis of article by N.A. Dobrogorskiy, p 36/

/Text/ The differentiation of coals according to chemical composition of ash during the use of their wastes. One table.

UDC 553.94:551.24.01:622.01

THE CONNECTION BETWEEN FRACTURE TECTONICS AND THE GRADE COMPOSITION OF COALS IN THE SOUTHERN DONBASS

/Synopsis of article by F.A. Gordon-Yanovskiy and I.L. Safronov, p 37/

/Text/ Changing the grade composition of coals as the consequence of paleoshifts of individiaul techtonic units; the practical importance of the question. One illustration.

UDC 55.001.2-192:622.01

THE RELIABILITY OF THE GEOLOGICAL BASE FOR DESIGNING MINES

/Synopsis of article by A.V. Bezaz'yan, pp 38-39/

/Text/ The reliability of the initial geological base for designing mines; tasks for improving the methods for its preparation. The results of the analysis of the reliability of the forecasts of the techtonic discontinuity of the mine fields, the morphology of the coal seams, the natural presence of gas and the hazard of it being released, the stability of the surrounding rock, and the hydrogeological conditions. One bibliographic entry.

UDC 622.235.5.001.5

DOCUMENTS FOR BLAST DRILLING DURING THE DIGGING OF VERTICAL SHAFTS

/Synopsis of article by I.I. Khokhlov, Ye.B. Novik and A.S. Polyakov, p 40/

/Text/ Estimating the parameters of blast drilling work when digging vertical shafts. A methodology for estimating the blast drilling documentation in the Donetskshakhtoprokhodka /Donetsk mine drilling/ Trust. One illustration.

8927
CSO: 1822/204

ALTERNATE FUELS

KEY ARTICLES OF PEAT INDUSTRY JOURNAL SUMMARIZED

Moscow TORFYANAYA PROMYSHLENNOST' in Russian No 3, Mar 83 p 32

/Synopses of key articles contained in No 3 of TORFYANAYA PROMYSHLENNOST'/

/Text/ UDC 622.331: /631.312.34/
Vaganov V.V. A technological system for the extraction of shredded peat from shallow deposits. TORFYANAYA PROMYSHLENNOST', 1983 pp 10-12.
A technological system for extracting shredded peat for fertilizer from shallow peat deposits is examined. 3 illustrations.

UDC622.331: /634.0.367/
Girshin M.Ye., Kuskov Yu.D. A multipurpose machine for extracting woody impurities, TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 12-14.
A description is given of the theoretical and experimentally confirmed preconditions for the creation of a multipurpose grubbing machine for extracting woody impurities throughout the entire map area, including strips of land near trenches. Data are cited on the production test of the experimental model of the MTP-81 machine with a self-contained motor at the Naziya Peat Enterprise. 2 illustrations.

UDC 622.331.002.5:621.004
A study of wear and tear on peat production machinery using diagnostic methods, V.I. Yeryshov, F.I. Kolymagin, A.N. Luk'yanchikov, D.D. Petrov, TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 14-15.
Full utilization of peat machinery and tractors requires the introduction of technical diagnostic procedures, which will make it possible to determine the true needs of a machine in any given state and to eliminate the premature performance of capital repairs. 1 illustration, 3 references.

UDC 662.812:65.011.56
Production tests of a system for the automatic regulation of press temperature. N.P. Yel'nikov, L.V. Taratorin, N.M. Grishkkov and others, TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 16-18.
Substantiation is provided for the need to apply automatic temperature regulation to the master channels of a press.
The operational principle is described for the experimental model of the automatic temperature regulation system for the SAT-0 press and the results of its production tests. 1 table, 3 illustrations.

UDC 662.812.002.22
Maruk N.P., Boriseyko V.V., Terentyev A.A. Pressing peat-coal mixtures. TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 18-19.
The results are cited from studies to determine the dependence of elastic properties of peat-coal briquets on the ratio of the components and the specific load of the die. 2 illustrations, 5 references.

UDC 622.331: [553.26+624.131.31]7
Amaryan L.S., Bazin Ye.T., Stepanichev V.G. Investigation of peat residue on the slopes of channels. TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 20-22.
Results are given from investigations of the residues of surface type peat deposits on the slopes of drainage channels. A method is given for a predictive evaluation of the reduction in channel depth as a result of compacting the peat on the slopes of the drainage channels. 2 tables, 3 illustrations, 6 references.

UDC 553.97:624.131.439
Fedotov A.I. The influence of the mineral portion on the aquatic and the structural strength characteristics of peaty soil. TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 23-25.
It was established that the dependence of the strength of the bonds between the particles in peaty soil on the content of mineral substances takes place by way of a maximum. Sufficient structural strength is formed in the soil (with reference to erosion resistance) at a moisture content of 65-80 percent of the total moisture capacity after preliminary compacting und under a pressure of 20-50 kPa. This ensures an optimal air content for the soil, especially when the content of mineral substances is up to 35 percent. Total moisture capacity and the moisture content at the start of meniscus formation in the contacts of the particles and the maximum hygroscopic moisture content of peaty soil are reduced linearly as the content of mineral substances is increased. 3 illustrations, 7 references.

UDC 665.36
Ivanova L.A. The chemical content of peat wax. TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 35-26.
Data are generalized from an investigation of the chemical composition of peat wax, data which make it possible to provide grounds for using it in new areas of the national economy. 4 references.

UDC 622.331:636
Naumova G.V., Bratishko R.F., Loyko M.N. Sphagnum peat--a raw material for the production of fodder supplements, TORFYANAYA PROMYSHLENNOST', 1983, No 3, pp 28-29.
The technical requirements are specified for peat designed to be used in obtaining fodder supplements utilized in animal husbandry to fatten pigs and young cattle. 1 table, 5 references.

8543
CSO: 1822/209

SOLAR HEAT USED IN HOUSING

Tashkent EKONOMIKA I ZHIZN' in Russian No 2, Feb 83 pp 37-39

[Article by B. Beder, Honored Geologist of the Uzbek SSR, member of the Republic Council of the Society for Natural Conservation in Uzbekistan, candidate of geological-mineralogical sciences: "The Sun in the Home"]

[Text] The depletion of the traditional nonrenewable energy sources, which include fossil fuels, has posed to experts in various countries the need to develop effective technologies for utilizing so-called renewable resources. These are chiefly nuclear energy, water power, wind power, tidal power, geothermal energy, etc. In the last decade the utilization of solar energy has become extremely promising. Some advances have been scored in this field: the development of batteries for the direct conversion of solar to electrical energy and the rise of various types of solar heat absorbers used to heat buildings and provide them with hot water and refrigeration, along with solar-powered water desalinization plants and facilities for melting refractories.

Solar engineering is developing vigorously and a shower of the related patent applications is appearing, while at the same time the variety of new developments reported by periodicals is striking. Various techniques for the absorption and conversion of solar energy, its transmission and its storage in the form of heat or electricity have been developed. But the facilities and systems developed so far are largely experimental while those that proved reliable still are not widely used owing to their high cost. For this very reason, solar batteries have not yet been broadly applied to spacecraft.

A solar device for providing heat and hot water to a building is considered effective if its recoupment period is 10 years. But since its operation also results in savings of nonrenewable energy sources (coal, gas, etc.), such a long recoupment period is quite acceptable and the use of solar heating facilities is even now economically justified in many cases.

The mastery of solar energy is one way of accomplishing the practical task of conserving resources posed to the national economy by the 26th CPSU Congress. In our country the priority in developing the theory and practice of solar engineering rightly belongs to the scientists and engineers of the southern republics, primarily Uzbekistan and Turkmenia. Experimental houses utilizing the sun's energy for heating have already been built in Chirchik and Tashkent; a "solar building"equipped with sun-powered air conditioning has been erected in Ashkhabad, where also solar-powered desalination devices have been developed at the "Sun" Scientific-Technical Association of the Turkmen SSR Academy of Sciences. The Physico-Technical Institute of the Uzbek SSR Academy of Sciences has developed a facility for fusing refractories.

Experts are working on active and passive solar home heating systems. The active systems need an additional and external energy source to operate. That source is usually electricity, which powers the pump for the sun-heated water that yields its acquired heat to the premises being heated. The passive solar heating systems are based on utilizing the so-called thermal effect when the medium- and long-wave part of the solar spectrum on passing across a light-transparent material (glass, films) becomes converted to thermal radiation and heats the air and structures within the building.

Active systems serve to save up to 50 percent of fuel. They provide not only heat but hot water for the needs of living. The principal and so to speak working part of an active solar system is the solar absorbers or panels. They are most often panels with a blackened rear wall and a coil through which water flows. The top side of the panel is glassed in. These solar panels are installed on the roof and southern face of the building. They usually measure in area at least 50 percent of the area of the premises being heated. Hence, when solar panels are installed in the facade of the conventional four-story residential buildings, its appearance becomes unusual and strange. The transformation of a normally designed residential building into a solar building is not painless and does not preclude undesirable consequences. Owing to a decrease in the mobility of air on the premises, it happens not infrequently that living conditions worsen in the summer and illumination is reduced, which is particularly felt in the winter.

But perhaps the most undesirable result of the installation of active- system solar panels in building facades is the sharp decrease in the density of housing--by a factor of 1.5 to 2 compared with the standards. This factor essentially precludes large-scale construction of such buildings in urban areas, since it leads to inefficient use of valuable urban areas, requires longer utility lines, mass transit routes, etc. In front of the facades of buildings with solar panels, that is, in front of the facades with southern exposure, shadow-providing greenery cannot be planted, which negatively affect the sanitary-hygienic and esthetic qualities of the environment.

But there also exist buildings that are especially designed for the task of solar energy utilization, on an active system basis. Houses with arrays of solar panels representing a sloping side of a roof or a sloping wall-roof present an interesting appearance. But such houses usually are single-family suburban homes that are unsuitable for dense urban build-up.

Passive solar heating systems do not require for their operation an extra energy source and a hot water piping system. Hence the development of these systems is linked to the solution of the broader problem of natural air conditioning, construed as the design of buildings in which the microclimate is regulated in a natural manner, without using expensive heating systems in winter and air conditioning systems in summer. In buildings of this type it is sufficiently warm in winter and cool in summer.

In the republics of Soviet Central Asia, where the sky is cloudless for more than one-half of all the days in the year, the introduction of solar heating and hot water supply system in mass housing construction appears extremely promising. Work in this direction is under way at the Uzbek Physico-Technical Institute, the TashZNIIEP [Zonal Scientific Research and Design Institute for Standard and

Experimental Design of Residential and Public Buildings]
the Tashgiprogor [Tashkent State Institute for Urban Planning], the Uzgiprosel'stroy [Uzbek State Institute for Rural Housing and Civil Engineering Construction], the UzNIIPgrdostroitel'stva [Uzbek Scientific Research Institute for Urban Construction] and others.

The TashZNIIEP has drafted designs of two-story houses of rural type with a sloping southward wall covered with active-system solar panels. The interlocking of twin-apartment houses served to reduce heat loss 30 percent and increase the efficiency of the solar heating system. Designs of kindergarten buildings with solar panels on roof and isolated racks have been worked out.

At present, however, it appears expedient, along with the use of active solar heating systems, to focus the efforts of designers on the development and broad utilization of the principles for the natural air conditioning of buildings, and especially for the use of passive solar heating systems.

Heat engineering experts believe that,first of all, a building should be so designed as to minimize its heat loss in winter before expenditures on some or other heating system are considered. The adjoining series of houses so characteristic of urban architecture in Soviet Central Asia are an instructive example of the natural air conditioning of structures. The old-town sections of cities in Central Asia--Bukhara, Khiva, Samarkand--were built with the aid of various techniques protecting the dwelling units against overheating in summer and chill in winter. In these sections two or three walls of every building--a single-family house--are continguous with the adjoining buildings, which reduces heat loss in winter and heat influx in summer. Only the walls of the rooms facing outward remain exposed to the air.

Low-rise buildings with adjoining terraces resembling the traditional layout but provided with up-to-date utilities are currently being designed and built in various cities of Central Asia--Tashkent, Ashkhabad, Khiva. The TashZNIIEP has designed a series of standard dwelling modules which together with their adjoining terraces represent walled-in houses. In the last 15-20 years such designs have become widespread abroad. The reason for their popularity lies chiefly in the combination of two normally irreconcilable qualities: a relatively high degree of amenities in the private home and fairly high urban-planning indicators as reflected in the density of the housing stock (floor area per area unit of the building lot). Such designs make it in principle possible to achieve high thermal-engineering qualities of rows of contiguous low-rise structures.

A related study, performed with the aid of computers and manual calculations of thermal-engineering qualities has led to the drafting of design proposals for special types of residential build-up. In the proposed variants of contiguous build-up (one- to four-story houses) each apartment is provided with terraces measuring 22 to 40 sq m in area that can be glassed-in during winter. It is the terrace that represents the facility which on sunny winter days collects solar heat owing to the hothouse effect and at night and on overcast days reduces the heat loss of the heated premises. A prerequisite for this type of build-up is that the glassed-in area should be smaller than the area of the walls of heated premises facing the terrace.

Calculations have shown that using the glassed-in terrace as a passive-system solar heat collector serves to reduce by 50-65 percent the heat loss per dwelling and for the entire build-up area. The capital outlays on glassing-in the

terraces are recouped within a single heating season owing to the attendant fuel savings. The lower heating demand of such build-up areas can be largely met by also using an active solar heating system. In this event, solar energy meets 85-90 percent of the heating demand, which makes it possible to dispense with costly utility installations. The remaining difference between needed and available heat (5-10 percent) is readily offset by using electricity.

The design proposals drafted represent the first attempt to develop not just discrete solar houses but entire integral architectural areas in which techniques for natural air conditioning are employed and which is equipped with active solar heating systems.

Economic analysis of the developed variants of such areas showed that they are not more expensive than the conventional construction of four-story houses typical of the cities of Uzbekistan. The attendant fuel savings, as calculated for a housing section containing 2,000 dwellers, will total 148,000 rubles in 10 years. It is this figure that is regarded as the indicator of the economic effectiveness of solar-heated contiguous low-story build-up areas.

The mass introduction of the proposed types of housing will conserve the energy of the traditional types of fuel, shorten the extent of heating mains and provide comfortable apartments to large families.

Low-rise contiguous build-up areas with solar heat may prove particularly expedient in places remote from the sources of conventional types of fuel--in the hinterlands of the Karakum and Kyzylkum and in alpine regions. Such a type of build-up is highly desirable for many towns and medium-sized cities lacking central heating and hot water supply systems.

Thus, two seemingly discrete trends are emerging in the development of methods for the utilization of solar energy in housing: the development of devices and facilities for active solar heating systems, whose design is the task of the engineer, and the development of special building designs and layouts securing high thermotechnical characteristics and the utilization of solar energy, which is the task of the architect. An optimal utilization of the energy of the sun meeting the tasks of mass housing construction can be accomplished only through the combined effort of the architect and the engineer.

The first result of this cooperation should be experimental construction and practical trials of the fruitfulness of the ideas proposed.

1386
CSO: 1822/215

TECHNICAL, ECONOMIC INDICATORS OF POWER SYSTEMS FOR ISOLATED AREAS COMPARED

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR SERIYA OBSHCHESTVENNYKH NAUK in Russian No 4, 1982 pp 83-86

[Article by S. Seyitkurbanov: "Technical and Economic Indicators of Electric Power Systems for Autonomous Consumers"]

[Text] Traditional diesel electric power stations (DES's) and, occasionally, electric power lines are employed for electric power supply to autonomous consumers in the desert regions of Central Asia and Kazakhstan. Recently, as a result of the favorable solar and wind conditions in these regions, a number of authors have recommended that solar thermoelectric generators (STEG's) [4] and solar photoelectric converters (SFEP's) [8] as well as wind electric power stations (VES's) [10] and solar electric power stations (SES's) be employed. Up until the present time, however, the existing methods of electric power supply have not been compared on the basis of the low level of power consumption and the dispersion of autonomous consumers.

The major consumers of electric power in desert regions are watering stations, meteorological stations, small population centers, geological survey teams, etc. With the development and introduction of autonomous pastureland solar power complexes, the solution of this problem acquires even greater significance.

The density of the electric load in desert regions is low and amounts to 1-2 kW/km^2. Electric power is used primarily for lighting and for the operation of a small number of electrical home appliances, while in sheep farming it is used for raising and purifying water for watering purposes, for shearing sheep, etc.

We studied electric power supply to desert pastureland using electric power transmission lines, SES's, DES's, STEG's and SFEP's. The most suitable version of electric power supply was selected on the basis of the minimum adjusted per-unit expenditure. The adjusted expenditure of electric power in a power transmission line can be determined from the expression

$$\bar{e} = \left[\sum_{i=1}^{t=n} C_{pl_i} \frac{a_i + b_i}{100} + \sum_{i=1}^{i=n} C_{sub_i} \frac{a_i' + b_i'}{100} + C_{я} \frac{a_i'' + b_i''}{100} + \right.$$

$$\left. + c_e \left(\sum \Delta W_{pl} + \sum \Delta W_{sub} + W_{ap} + W_p \right) + \bar{e}' \right] / W_p$$

The capital expenditures for the construction of electric power transmission lines is determined according to the formula

$$\sum_{i=1}^{i=n} C_{pl_i} = \sum l_i c_{s_i} c_{top} \cdot c_{win} c_t \text{ thousand rubles/km}$$

where l_i is the length of the line segment, km, with the materials, conductor cross-section, type of support and geographical conditions identical; c_{si} is the per-unit cost of a segment of overhead line under the conditions indicated above, rubles/km; c_{top} and c_{win} are coefficients which take into consideration the topographical and wind conditions; and c_t is the territorial coefficient.

The overall power loss in transmission lines is calculated according to the formula

$$\sum \Delta W_{pl} = \sum \frac{P_{cal}^2}{U_i^2} r\tau 10^{-3} \text{ kWh/yr}$$

where P_{cal} is the calculated output, kVA; U_i is the nominal circuit voltage, kV; r is the active resistance in the conductor, Ω/km; τ is the number of hours lost annually. The value of τ depends upon the time the line is used under maximum load in rural areas as well--for 35-kV overhead lines and regional transformer stations, $\tau \approx 2000$ h; for 10-kV overhead lines, $\tau \approx 1500$ h; for 10/0.4-kV transformer stations, $\tau \approx 1450$ h [2, 5].

The amount of power lost in transformer substations was determined according to the formula

$$\sum \Delta W_{sub} = \left[8760 P_{nl} p_{tr} + \frac{P_{ss}}{p_{tr}} \left(\frac{P_{cal}}{p_n} \right)^2 \tau k_e \right]$$

where P_{nl} and P_{ss} are the no-load and short-circuit losses in the transformers, kV [9]; p_{tr} is the number of transformer substations; k_e is the coefficient of power-loss dynamics, $k_e \approx 1.0$ [5].

The annual outlay for the payroll for operational personnel and for other operational expenses was determined according to the relation [2]

$$e' = 35 \left(Y_{pl_i} + Y_{sub_i} Y_{я} \right) L_{pl_i}$$

where Y_{pl_i} is the number of arbitrary units for servicing the corresponding equipment and structures within the power systems. This value is taken from work [2]; in this case, 35 rubles/yr is the avereage per-unit norm for one arbitrary unit.

The usable power delivered to consumers was taken from the calculation

$$W_p = P_{cal} T \text{ kWh/yr}$$

In areas served by an agricultural substation, the maximum value for T is taken to be equal to 3,000-3,700 h/yr.

The adjusted expenditure of electric power delivered by a diesel electric power station will be

$$\bar{e} = \left\{ C_{des} \frac{a_i' + b_i'}{100} = e'' c_{add} + \left[P'_{cal} \tau (g_f c_f + g_l c_l) \right] + c_{tr} L Q_t \right\} / W_p$$

where C_{des} is the capital expenditure for the construction of a diesel electric power station, rubles (fig. 1a); a_i, b_i are the standards for depreciation allowance and scheduled maintenance, %; e" is the expenditure for the personnel's payroll and the servicing of the diesel electric power station, rubles; c_{add} is a coefficient which takes into consideration the various payroll bonuses--for the desert regions of Turkmenia, c_{add} = 1.7; P'_{cal} is the calculated output of the diesel electric power unit, kW; t is the time the unit operates annually, h; g_f and g_l are the per-unit expenditures for fuels and lubricants, kg/kW; c_f and c_l are the costs of the fuels and lubricants, rubles/kg; c_{tr} are the per-unit expenditures for the delivery of a ton-kilometer of fuel and lubricants, rubles/ton-kilometer; L is the distance over which the fuels and lubricants are to be transported, km; Q_t is the annual expenditure of fuels and lubricants, t.

The adjusted expenditure of electric power from solar and wind converters was determined according to the formula

$$\bar{e} = \frac{pC + E_i}{W_p} \text{ rubles/kWh}$$

where p = 0.15 is the coefficient of economic effectiveness of capital investment; C is the capital investment in solar and wind converters, rubles; E_i are the operating expenses, rubles/yr.

The following values of the initial parameters were employed in the calculations: For the transmission line there are 60 watering stations; the necessary unit output at a watering station is 5 kW, while at the central farmstead the output is 200 kW; the system voltage is 35/10 kV; there is 1 110/35 substation, 10 35/10 substations and 60 10/04 substations; l_{35} = 100 km; l_{10} = 500 km; the values of c_{si}, c_{top}, c_{win}, c_t, c_{sub} and $c_я$ are taken from the handbook [9]; c_e = 1.1 kopecks/kWh; the expenditure of electric power for the substation's auxiliary power needs W_{ap} is 5% of the system's calculated output [9]. For diesel electric power stations, e" is 2,600 rubles [2]; P_{cal} is 5 kW; c_{des} is from fig. 1 ; g_f = 0.28 kg/kWh; g_l = 0.028 kg/kWh [1]; c_f = 72 rubles/yr; c_e = 210 rubles/t [3]; c_{tr} = 0.1 rubles/ton-kilometer [7]; L = 100 km.

For solar and wind electric power converters: c_{SFEP} = 60,000 rubles/kW [9]; c_{STEG} = 20,000 rubles/kW [4]; c_{SES} = 6,000 rubles/kW (data from the "Solntse" nongovernmental organization); c_{VES} is from fig. 1b. Amortization norms in percentages for the amortization and scheduled maintenance of electric power systems are taken from works [2, 6, 8, 9]. The adjusted electric power expenditures were calculated for current levels of power-installation capital expenditures and the price for fuels

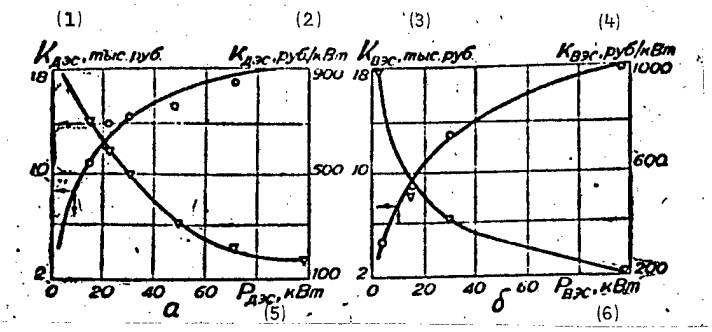

Figure 1 (a, b). a) Capital expenditures for the construction of a diesel electric power station; b) for wind electric converters.

Key:

1. Capital expenditures for a diesel electric power station, thousands of rubles
2. Capital expenditures for a diesel electric power station, rubles/kW
3. Capital expenditures for a wind electric power station, thousands of rubles
4. Capital expenditures for a wind electric power station, thousands of rubles
5. Output of a diesel electric power station, kW
6. Output of a wind electric power station, kW

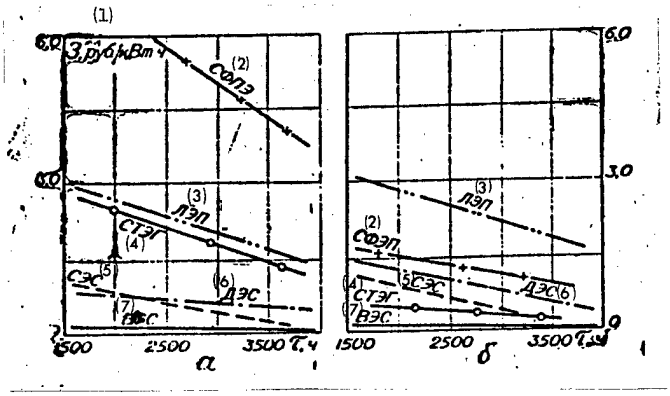

Figure 2 (a, b). a) Electric power expenditures for current levels of capital expenditures for power installations; b) reduction of capital expenditures and increase in POL costs.

Key:

1. Expenditures, rubles/kW
2. SFEP
3. Power transmission line
4. STEG
5. SES
6. DES
7. VES

and lubricants (fig. 2*a*). They are also based on a reduction in the capital expenditures for STEG's and SFEP's by a factor of 5 and an increase in the price of POL materials by a factor of 2 (fig. 2*b*). Considerable changes in the per-unit capital expenditures for the construction of power lines, SES's, DES's and VES's are not expected. The economic effectiveness of electric power systems depends to a considerable degree upon the number of hours τ that the installed capacity of autonomous power installations is utilized and the duration T of the utilization of power lines at maximum load. For example, when τ = 2,000 h/yr, the adjusted expenditures for electric power produced by an STEG is approximately 2.5 rubles/kWh, while the figure is 1.67 rubles/kWh when τ = 3,000 h/yr, that is, the cost of electric power is reduced approximately by a factor of 1.3 (see fig. 2*a*).

For regions with favorable wind conditions, the most efficient power system is a system of VES's. Depending upon τ, the adjusted electric power expenditures amount to 0.072-0.125 rubles/kWh. In the future, the cost of electric power generated by STEG's, DES's and SES's will not be significantly different and will amount to 0.5-1.2 rubles/kWh. In the case under examination, solar thermoelectric generators (STEG's) or electric power stations with thermodynamic cycles (SES's) are the most promising for power supply in regions possessing unfavorable wind conditions.

In order to regulate the generation of electric power from solar or wind converters on the basis of a consumption schedule, electric storage batteries are also required. The size of the batteries depends basically upon the solar power conditions in the areas under consideration and the schedule of electric power consumption. As a result of this, the electric power generated by these units has become somewhat more expensive. In connection with this, as well as with taking into consideration the feasibility of increasing the area of application of renewable energy sources and the reliability of power supply to autonomous consumers, it is sometimes more preferable to utilize integrated solar power units.

It is advisable to develop and introduce various electric power systems which utilize renewable energy sources and which are intended for power supply to autonomous consumers in the desert regions of Central Asia and Kazakhstan. The efficiency of these installation will basically be determined by the solar radiation and wind conditions in a given region, the specific nature of the consumers' requirements and and the level of refinement and mastery of the production of individual installations.

Technical and economic calculations have shown that the electric power supply to cattle farms, small population centers and water-pumping and purification stations located in desert regions possessing favorable wind conditions is more suitably realized through the use of wind-powered electric generating installations. Their production has been mastered to a sufficient degree, and this makes it possible to make the transition to the extensive introduction of VES's into practice in the economy.

In areas with an average annual wind velocity of 3.5 m/s, the supply of electric power to autonomous consumers in the future can be accomplished with the help of solar electric power stations. The extensive introduction of such units into the economy, however, requires an improvement in their efficiency, a reduction in their cost and the mastery of the production of solar installations.

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